Patent
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Charles W. Stewart

Date: August 18, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re application of	)	
	)	
EDUARD R. GEUS, JOHN W. HARRIS, And JOHAN J. B. PEK	)	
	)	
Serial No. 09/980,059	)	Group Art Unit 1764
	)	
Filed November 29, 2001	)	Examiner Tam M. Nguyen
	)	
PROPENE RECOVERY	)	August 18, 2003
	)	

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

This brief is submitted in the appeal of the Examiner's final rejection of claims 1-7 of the above-identified U.S. patent application. The Examiner's final rejection was contained in the Office Action mailed July 1, 2003. This brief is filed concurrently with Appellants' Notice of Appeal. Appellants respectfully request the Board to consider the following arguments and reverse the Examiner's final rejection of claims 1-7 in the application.

Real Party in Interest

Shell Oil Company is the assignee of record of this patent application and is the real party in interest in this appeal.

Related Appeals and Interferences

There are no known appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decisions on this appeal.

Status of Claims

Claims 1-7 are finally rejected under 35 U.S.C. §103(a). This final rejection of claims 1-7 is presently appealed.

State of Amendments

No amendments have been filed subsequent to the Examiner's final rejection of claims 1-7 in the Examiner's office action mailed July 1, 2003.

Summary of the Invention

The invention is a process to separate propene from gaseous fluid catalytic cracking (FCC) products. *See e.g.*, page 1, lines 1-3. The inventive process provides for improved propene recovery from an FCC product and other benefits as compared to other FCC gas plant processes. *See e.g.*, page 2, lines 25-28; page 3, lines 17-31; page 8, lines 12-16; Examples. In the invention, a feed mixture obtained from a fluid catalytic cracking process and which comprises gaseous products, propene and other saturated and unsaturated hydrocarbons ranging from methane to hydrocarbons having a boiling point of 250°C is separated into a hydrocarbon-rich liquid fraction and a hydrogen containing gaseous fraction. *See e.g.*, page 3, line 32 – page 4, line 25. The hydrogen containing gaseous fraction undergoes a separation at temperature conditions of between 50 and 100°C into a hydrogen-rich gaseous fraction and a hydrocarbon-rich gaseous fraction by use of membrane separation means. *See e.g.*, page 4, line 25 – page 5, line 2. The membrane separation means is defined by having a methane separation selectivity and a hydrogen separation selectivity. *See e.g.*, page 4, line 25 – page 5, line 3. The hydrocarbon-rich gaseous fraction from the membrane separation means is supplied to an absorber section, wherein to the top or discharge end of the absorber section a liquid hydrocarbon mixture is supplied to, which liquid hydrocarbon mixture is poor in propene, and yielded from the absorber section is a lower boiling gaseous fraction rich in gaseous products having a boiling point of ethane or below. *See e.g.*, page 6, line 30 – page 7, line 21. The hydrocarbon-rich liquid fraction resulting from the separation of the feed mixture is supplied to a stripper section, and yielded from the stripper section is a gaseous fraction and a higher boiling fraction comprising propene and hydrocarbons having a boiling point higher than ethane. *See e.g.*, page 7, line 22 – page 12.

Issue

Whether claims 1-7 are obvious under 35 U.S.C. §103(a) over the Harandi patent, U.S. patent 4,605,493.

Grouping of Claims

Claims 1-7 do not stand or fall together.

Argument

§103(a) Rejection of Claims 1-7

Appellants respectfully assert that the Examiner has failed to make a case of prima facie obviousness of their claimed invention in that she relies only upon the single Harandi patent to support her obviousness rejection when the reference not only fails to teach or suggest all of the Appellants' claim limitations; but, further, there is no suggestion in the Harandi patent that its taught process may be modified so as to provide for the benefits provided by Appellants' claimed invention, among which is a significant improvement in propene recovery from an FCC hydrocarbon stream.

The Harandi patent discloses a gas plant for processing a hydrocarbon stream from an FCC process system. The Harandi patent discloses processes that include a separator for separating the FCC process system hydrocarbon stream into a gas fraction and a liquid fraction. Both these fractions are passed to at least another separator. The resulting separated liquid fraction is passed to a stripper and the resulting separated gas fraction is passed to an absorber.

The Harandi patent does not teach the use of membrane separation to separate hydrogen from its gas fraction to yield a hydrogen-rich stream, nor does the Harandi patent suggest that such a separation step may be used to improve propene recovery, especially when integrated with other elements of an FCC gas plant as in Appellants' claimed invention.

The Examiner recognizes that the Harandi patent does not teach or suggest the separation of hydrogen from the gaseous fraction of an FCC hydrocarbon stream before further passing the gas fraction to an absorber section as is recited in Appellants' claim1. But, she presents an unsupported, conclusory assertion that it would be obvious to modify the Harandi process to include hydrogen separation; allegedly, because, hydrogen is not a critical component of the Harandi process. It is further noted that the criticality or noncriticality of hydrogen to the Harandi process is irrelevant to the question of whether it is obvious to modify the Harandi process in such a manner as to include a hydrogen separation step so as to

provide for improved propene recovery. Harandi does not address the importance or nonimportance of hydrogen.

The Examiner also recognizes that the Harandi patent fails to teach or suggest the use of membrane separation of hydrogen from the gaseous fraction of an FCC hydrocarbon stream prior to passing the resulting hydrocarbon-rich gaseous fraction to an absorber section as recited in Appellants' claim 1. But, without citing any supporting prior art, the Examiner argues that, because membranes are known to be effective in separating hydrogen from hydrocarbon streams, it is obvious to modify the Harandi process to use membrane separation of the hydrogen from its gaseous fraction. The Examiner, however, ignores all the other elements of Appellants' claimed invention and how the membrane separation step, in combination with all the other steps of the gas processing process, provide for an improve propene recovery. These benefits are unrecognized by the Harandi patent.

The Examiner notes that the Harandi patent fails to disclose the use of both an absorber section and a stripping section that are combined in a single distillation zone as is recited in Appellants' claim 4. The Examiner makes the unsupported, conclusory statement that such a combination has an equivalent function as separate sections would have as in the Harandi patent. Appellants respectfully assert that the Examiner must present art that suggests such a conclusion, but, in any event, the results from operating separate absorber and stripping sections may certainly be different from the results from operating a single distillation zone, especially when the process elements and their configurations are different.

The Examiner also notes that the Harandi patent fails to disclose as recited in Appellants' claim 5 the feeding of liquid hydrocarbon at a position in the distillation column above the feed inlet of the gaseous feed. But, again, the Examiner makes the unsupported, conclusory assertion that the feed locations would not be expected to affect the outcome of the modified process of Harandi. This assertion is not correct. Those skilled in the art of distillation science recognize that the feed location to a distillation column can influence the ultimate separation.

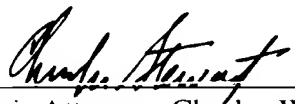
The Examiner also notes that the separation selectivities recited in Appellants' claims 6 and 7 are not disclosed in the cited Harandi patent. The Examiner fails to cite any secondary reference that teaches these limitations.

Conclusion

The Examiner has not pointed to any teaching in the Harandi patent suggesting that its process may be modified in the manner proposed by the Examiner. Nor does the Examiner cite any secondary reference to supply any of the elements and limitations of Appellants' claims missing from the Harandi disclosed process in order to provide Appellants' claimed invention. Considering that all the claim limitations of Appellants' claims are neither disclosed, nor taught, nor suggested by the Harandi patent, and that the advantages of Appellants' invention are also not recognized by the Harandi patent, Appellants' invention is clearly patentable thereover. Thus, reversal of the Examiner's rejection of claims 1-7 is hereby respectfully requested.

Respectfully submitted,

EDUARD R. GEUS, JOHN W. HARRIS,
And JOHAN J. B. PEK



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APPENDIX

CLAIMS ON APPEAL ARE 1-7:

1. Process to separate propene from gaseous fluid catalytic cracking products by performing the following steps:

a) separating a feed mixture comprising the gaseous products, propene and other saturated and unsaturated hydrocarbons ranging from methane to hydrocarbons having a boiling point to 250°C as obtained in a fluid catalytic cracking process into a hydrocarbon-rich liquid fraction and a hydrogen containing gaseous fraction,

b) separating, at a temperature between 50 and 100°C, the hydrogen containing gaseous fraction into a hydrogen-rich gaseous fraction and a hydrocarbon-rich gaseous fraction by membrane separation means defined by having a methane separation selectivity and a hydrogen separation selectivity,

c) supplying the hydrocarbon-rich gaseous fraction obtained in step (b) to an absorber section, wherein to the to the top or discharge end of the absorber section a liquid hydrocarbon mixture is supplied to, which hydrocarbon mixture is poor in propene, and obtaining in said absorber section a lower boiling gaseous fraction rich in gaseous products having a boiling point of ethane or below, and

d) supplying the hydrocarbon-rich liquid fraction obtained in step (a) to a stripper section and obtaining in said stripper section a gaseous fraction and a higher boiling fraction comprising propene and hydrocarbons having a boiling point higher than ethane.

2. The process of claim 1, wherein the gaseous fraction obtained in the stripping section is supplied directly to the absorber section.

3. The process of claim 1, wherein the higher boiling fraction is supplied to step (a)

4. The process of claim 1, wherein the stripping section and the absorber section are combined in one distillation column.

5. The process of claim 4, wherein the hydrocarbon rich liquid fraction obtained in step (a) is fed to a position in the distillation column above the feed inlet of the hydrocarbon rich gaseous fraction obtained in step (b).

6. The process of claim 1, wherein the hydrogen separation selectivity of the membrane separation in step (b) is greater than 20, wherein the hydrogen separation selectivity is defined as the permeability ratio of hydrogen over methane.

7. The process of claim 1, wherein the methane separation selectivity of the membrane separation in step (b) is greater than 5, wherein the methane separation selectivity is defined as the permeability ratio of methane over propane.